The Embedded I/O Company

TEWS TECHNOLOGIES

TIP816

Extended CAN Bus IP

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TIP816-10

Extended CAN Bus IP

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Style Conventions

Hexadecimal characters are specified with prefix 0x, i.e. 0x029E (that means hexadecimal value 029E).

For signals on hardware products, an ‚Active Low' is represented by the signal name with # following, i.e. IP_RESET#.

Access terms are described as:

W	Write Only
R	Read Only
R/W	Read/Write
R/C	Read/Clear
R/S	Read/Set

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1 Product Description

The TIP816 is an IndustryPack® compatible module and offers a complete CAN bus interface using the Intel 82527 CAN controller. The Intel 82527 CAN controller supports the standard data and remote frame as well as the extended data and remote frame according to CAN specification 2.0 part A and part B. It has the capability to transmit, receive and perform message filtering on extended and standard messages.

The TIP816 supports a 16 bit bus interface which permits word and byte accesses to the internal registers of the CAN controller. The physical interface supports CAN High Speed (according to ISO11 898) as well as modified RS485. Both physical interfaces are optically isolated from the CAN controller.

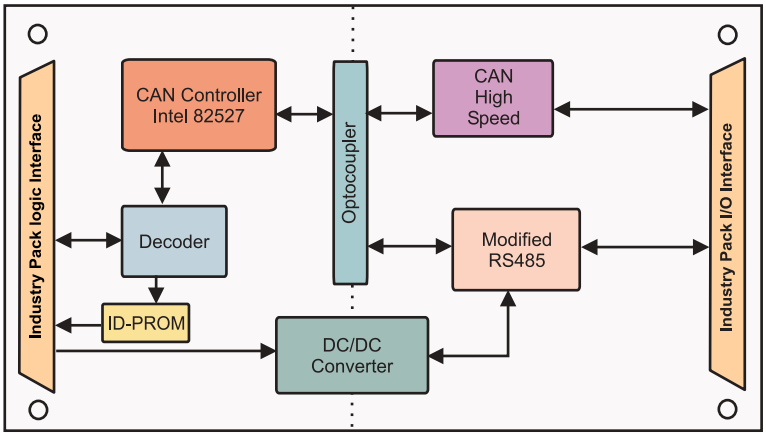

Figure 1-1 : Block Diagram

2 Technical Specification

Interface	Single Size IndustryPack® Logic Interface compliant to ANSI/VITA 4-1995	
I/O Interface	50-conductor flat cable	
CAN Controller	Intel 82527	
Physical Interface	CAN High Speed (according to ISO11898)	
Isolation	CAN bus isolated by optocouplers	
Wait States	IDSEL#: no wait states IOSEL#: no wait states INTSEL#: no wait states MEMSEL#: 1 wait state minimum	
Power Requirements	0.2A maximum @ +5V DC	
Physical Data		
Temperature Range	Operating Storage	-40°C to +85°C -40°C to +125°C
MTBF	272361 h	
Humidity	5 – 95 % non-condensing	

Figure 2-1 : Technical Specification

3 ID Prom Contents

Address	Function	Contents
0x01	ASCII 'I'	**0x49**
0x03	ASCII 'P'	**0x50**
0x05	ASCII 'A'	**0x41**
0x07	ASCII 'C'	**0x43**
0x09	Manufacturer ID	**0xB3**
0x0B	Model Number	**0x1B**
0x0D	Revision	**0x10**
0x0F	Reserved	**0x00**
0x11	Driver-ID low byte	**0x00**
0x13	Driver-ID high byte	**0x00**
0x15	Number of bytes used	**0x0D**
0x17	CRC	**0xCC**
0x19	Version -10	**0x0A**

Figure 3-1 : ID PROM Contents

4 Memory Space Addressing

The complete register set of the CAN controller and the Interrupt Vector Register of the TIP816 are accessible in the memory space of the IP. Byte and word accesses to the register set are supported.

Address range: IP_memory_base_address + (0x0000 to 0x01FF)

CAN controller: IP_memory_base_address + (0x0000 to 0x00FF)

Interrupt Vector Register INTVEC: IP_memory_base_address + (0x0101)

4.1 Memory Address Map

Address	Symbol	Description
CAN Controller		
0x0000		Control Register
0x0001		Status Register
0x0002		CPU Interface Register
0x0003		Reserved
0x0004-0x0005		High Speed Read Register
0x0006-0x0007		Global Mask – Standard
0x0008-0x000B		Global Mask – Extended
0x000C-0x000F		Message 15 Mask
0x0010-0x001D		Message 1
0x001E		Message 1
0x001F		CLKOUT Register
0x0020-0x002D		Message 2
0x002E		Message 2
0x002F		Bus Configuration Register
0x0030-0x003D		Message 3
0x003E		Message 3
0x003F		Bit Timing Register 0
0x0040-0x004D		Message 4
0x004E		Message 4
0x004F		Bit Timing Register 1
0x0050-0x005D		Message 5
0x005E		Message 5
0x005F		Interrupt Register
0x0060-0x006D		Message 6
0x006E		Message 6
0x006F		Reserved
0x0070-0x007D		Message 7
0x007E		Message 7

Address	Symbol	Description
0x007F		Reserved
0x0080-0x008D		Message 8
0x008E		Message 8
0x008F		Reserved
0x0090-0x009D		Message 9
0x009E		Message 9
0x009F		P1CONF
0x00A0-0x00AD		Message A
0x00AE		Message A
0x00AF		P2CONF
0x00B0-0x00BD		Message B
0x00BE		Message B
0x00BF		P1IN
0x00C0-0x00CD		Message C
0x00CE		Message C
0x00CF		P2IN
0x00D0-0x00DD		Message D
0x00DE		Message D
0x00DF		P1OUT
0x00E0-0x00ED		Message E
0x00EE		Message E
0x00EF		P2OUT
0x00F0-0x00FD		Message F
0x00FE		Message F
0x00FF		Serial Reset Address
Interrupt Vector Register INTVEC		
0x0101	INTVEC	Interrupt Vector Register

Figure 4-1 : Memory Address Map

4.2 Interrupt Vector Register INTVEC (Address 0x0101)

Bit	Symbol	Description	Access	Reset Value
8:0		Interrupt Vector is loaded by software. The Intel 82527 CAN controller can generate interrupts on interrupt request line INTREQ0# of the IP bus.	R/W	

Figure 4-2 : Interrupt Vector Register INTVEC (Address 0x0101)

5 Programming

5.1 Programming the Intel 82527 Controller

For programming the Intel 82527 CAN bus controller please refer to the Intel 82527 Data Book which is part of the TIP816-ED Engineering Documentation.

6 Installation

6.1 Configuration of the TIP816-10

The TIP816-10 must be configured by the jumper field J1 for the desired physical interface:

CAN High Speed	Jumper 1-3 and 2-4 installed
Modified RS485	Jumper 3-5 and 4-6 installed

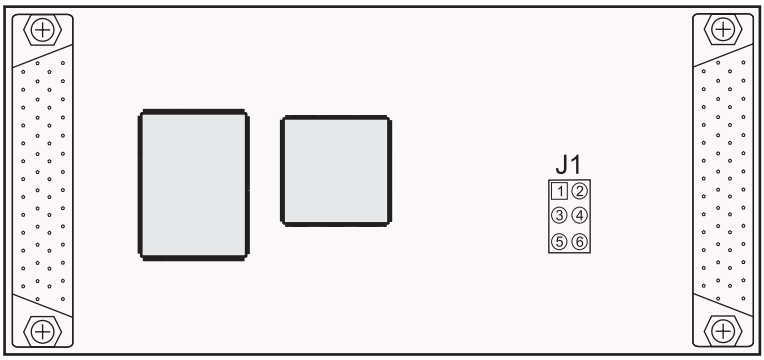

Figure 6-1 : Jumper Configuration

6.2 Bus Line Termination

To reduce the stub length of the TIP816 to a minimum, the CAN bus lines for high speed and for modified RS485 are connected twice to the IP I/O connector. That means the CAN bus is routed through the TIP816.

No termination is provided on board of the TIP816. If the TIP816 is located at one extreme of the CAN bus lines then external termination must be provided.

The CAN bus lines must be terminated at both extremes of the cable with a resistor connected between both CAN bus lines (CAN_H and CAN_L). Resistor value should be equal to the impedance of the twisted pair cable (typical 120 ohms).

7 Pin Assignment – I/O Connector

7.1 50 pin I/O flat cable

The 50 pin flat cable of the IP carrier board will be split into four 9 pin sections. Two sections of the 50 pin flat cable are routed to the CAN High Speed driver and the other two sections are routed to the modified RS485 driver.

7.1.1 Can High Speed (Pin 01-18)

The line 01 - 09 fit directly to a 9 pin SUB-D male connector. The assignment of the 9 pin SUB-D connector meets the suggestion of the CiA (CAN in Automation). Lines 01 - 09 are connected on board with line 10 - 18. In this way it is very easy to connect the TIP816 to the CAN bus.

I/O Line	9pin Sub-D	Description according to CiA
01	1	Reserved
02	6	(GND) Optional Input Ground
03	2	CAN_Lbus line CAN High Speed
04	7	CAN_H bus line CAN High Speed
05	3	GND Ground
06	8	Reserved (error line)
07	4	Reserved
08	9	(V+) Optional Input Power
09	5	Reserved
10	1	Reserved
11	6	(GND) Optional Input Ground
12	2	CAN_Lbus line CAN High Speed
13	7	CAN_H bus line CAN High Speed
14	3	GND Ground
15	8	Reserved
16	4	Reserved
17	9	(V+) Optional Input Power
18	5	Reserved

Figure 7-1 : CAN High Speed (Pin 01-18)

7.1.2 CAN with modified RS485 (Pin 33 -50)

The line 42 - 50 fit directly to a 9 pin SUB-D male connector. The assignment of the 9 pin SUB-D connector meets the suggestion of the CiA (CAN in Automation). Lines 42 - 50 are connected on board with line 33 - 41. In this way it is very easy to connect the TIP816 to the CAN bus.

I/O Line	9pin Sub-D	Description according to CiA
33	1	Reserved
34	6	(GND) Optional Input Ground
35	2	CAN_Lbus line RS485
36	7	CAN_H bus line RS485
37	3	GND Ground
38	8	Reserved (error line)
39	4	Reserved
40	9	(V+) Optional Input Power
41	5	Reserved
42	1	Reserved
43	6	(GND) Optional Input Ground
44	2	CAN_Lbus line RS485
45	7	CAN_H bus line RS485
46	3	GND Ground
47	8	Reserved
48	4	Reserved
49	9	(V+) Optional Input Power
50	5	Reserved

Figure 7-2 : CAN with modified RS485 (Pin 33-50)